

Solidification and morphological evolution of Al-Si eutectics in convective-diffusive conditions

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The Al-Si material system is an important and has been studied for over half century with a focus on industrial applications in high strength and high conductivity alloys. A great deal of researches have been focused on controlling the morphology and hence performance through the addition of small impurities and by processing conditions. Most of the structure-property correlations are based on the post solidified micromorphology and growth conditions. This material system is unique and has been explored for heat spreader, controlling coefficient of expansion by adjusting composition of silicon and in designing composites. Al-Si system is very interesting system for understanding the dendritic (Al-rich side) eutectic transition. Recently this system has been of great interest because of its applications in designing heat spreader, low temperature flux to grow SiC large substrates and in controlling the coefficient of expansion of Al-based alloys. We have performed extensive experiment to understand eutectic transition and to understand the morphological evolution in presence of impurities. We will discuss the results of dendritic transition into faceted long grains in convective-diffusive conditions. In this presentation we will present morphological transition in presence of carbon impurity and development of novel morphology.